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AN ARCHAEOLOGICAL INVENTORY AND ASSESSMENT STUDY OF FOUR PROJECTS FOR PANCANADIAN PETROLEUM LTD. IN THE WEYBURN BATTERY

by

J.T. Finnigan

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HRIA Permit Nos. 85-1, 85-9, 85-12, 85-39

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EXECUTIVE SUMMARY

This report describes the results of four archaeological projects completed by the Saskatchewan Research Council for PanCanadian Petroleum Ltd. in 1985. All four projects were located in close proximity to the Souris River, and its tributaries, in the area between Halbrite and Ralph.

The first project (HRIA Permit 85-9) involved the examination of four oil-well access roads and an undeveloped road allowance. A total of four archaeological resources were recorded (DjMw-33, 36, 37, 38). Three of these were located on a road allowance which was subsequently developed. The fourth resource was located on the access road to Well 6-9-7-13, west of the 2nd meridian, and it was recommended that the road be relocated at this location. Two additional archaeological sites were located by ARMS (DjMw-34, 35). Neither site will receive any additional impacts from these developments.

The second project (HRIA Permit 85-12) involved the examination of five pipeline replacements. No heritage resources were recorded for two of the replacements (Projects 62 and 66). A total of eight (DiMv-70, 71, 72, 73, 74, 75, 76 and DiMw-1) heritage resources were recorded between the remaining three pipeline replacements. For one site, DiMv-73 (Project 56), it was recommended that the replacement stay within the existing right-of-way in the vicinity of the resource. None of the remaining resources were in direct

conflict with the development. One of the sites, DiMv-70, is the oldest site recorded within the river valley to date.

The third project (HRIA Permit 85-1) involved monitoring the pipeline replacement across the Bennet site: DjMw-27. Twenty-one prehistoric hearths were recorded in the pipeline trench and two samples were obtained for radiocarbon dating. Both dates place the majority of the trench deposits to the time of Avonlea/Besant, approximately 0 to 800 A.D. A surface examination of the spoil pile, and of the project after completion, resulted in the recovery of four projectile points and 11 pottery sherds. Both the points and the pottery are consistent with the radiocarbon dates.

The final project (HRIA Permit 85-39) involved the examination of a well site and access road in 16-20-7-13, west of the 2nd. No heritage resources were recovered.

Together, these four projects have made a contribution to the archaeological understanding of Souris Basin prehistory. Twelve new resources have been recorded and our understanding of one previously recorded resource, the Bennet site has been greatly expanded. In addition, one of the new resources, DiMv-70, is the oldest resource recorded within the valley.

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1 INTRODUCTION

The following report describes the results of four archaeological projects which were completed by the archaeology subsector of the Saskatchewan Research Council (SRC) for PanCanadian Petroleum Ltd. (PCP) in 1985. Altogether, these projects included six pipeline replacements (one of which was monitored), one well site, and five well site access roads. Projects were selected for examination as part of an ongoing development screening agreement between the Archaeological Resource Management Section of Saskatchewan Culture and Recreation (ARMS) and PanCanadian Petroleum Ltd. These projects were completed under Heritage Resource Impact Assessment (HRIA) permit numbers 85-1, 85-9, 85-12 and 85-39.

The initial three sections of this report present background data relevant to all four projects. Following this, the results of each investigation are presented independently, with subsectors encompassing the development overview, methods, results, and recommendations. Finally the results of all four projects are summarized in Section 8.

All project descriptions are presented as legal land survey locations. Since all of the projects are located west of the second meridian, the four numbers that are presented represent the Legal Subdivision, Section, Township and Range.

2 PROJECT LOCATIONS

All four projects are located in close proximity to the Souris River and its tributaries in an area situated between a point roughly south of the Village of Halbrite to a point south of the Hamlet of Ralph, Saskatchewan (Figure 2.1). Here the Souris River occupies a shallow valley which was cut by glacial meltwaters through the Souris Till Plain. In the project area the valley is broad, but very shallow, making it difficult to define the valley edge. The slope of the valley sides is fairly gentle creating a variable topography that grades almost imperceptably from the valley floodplain to the valley summit.

According to Harris et al (1983:38-40), this area is situated within the Mixedgrass Prairie Ecodistrict. This region can be characterized as follows:

> The climate is warm and Dry. Annual precipitation is 375 mm of which 240 falls between May and September. ...About 1665 degree days are accumulated during the year. ...The Mixedgrass Prairie Ecodistrict consists of a variety of grasses and herbs of which the Spear Grasses, Wheat Grasses, June Grass are the most characteristic species of well drained uplands. ...Valleys show patches of brush dominated by willows, Saskatoon, Chokecherry, Snowberry, and Wolf Willow.

Historically, the major ungulate species present in the study area were bison, wapiti, mule deer and pronghorn antelope (Banfield 1974).

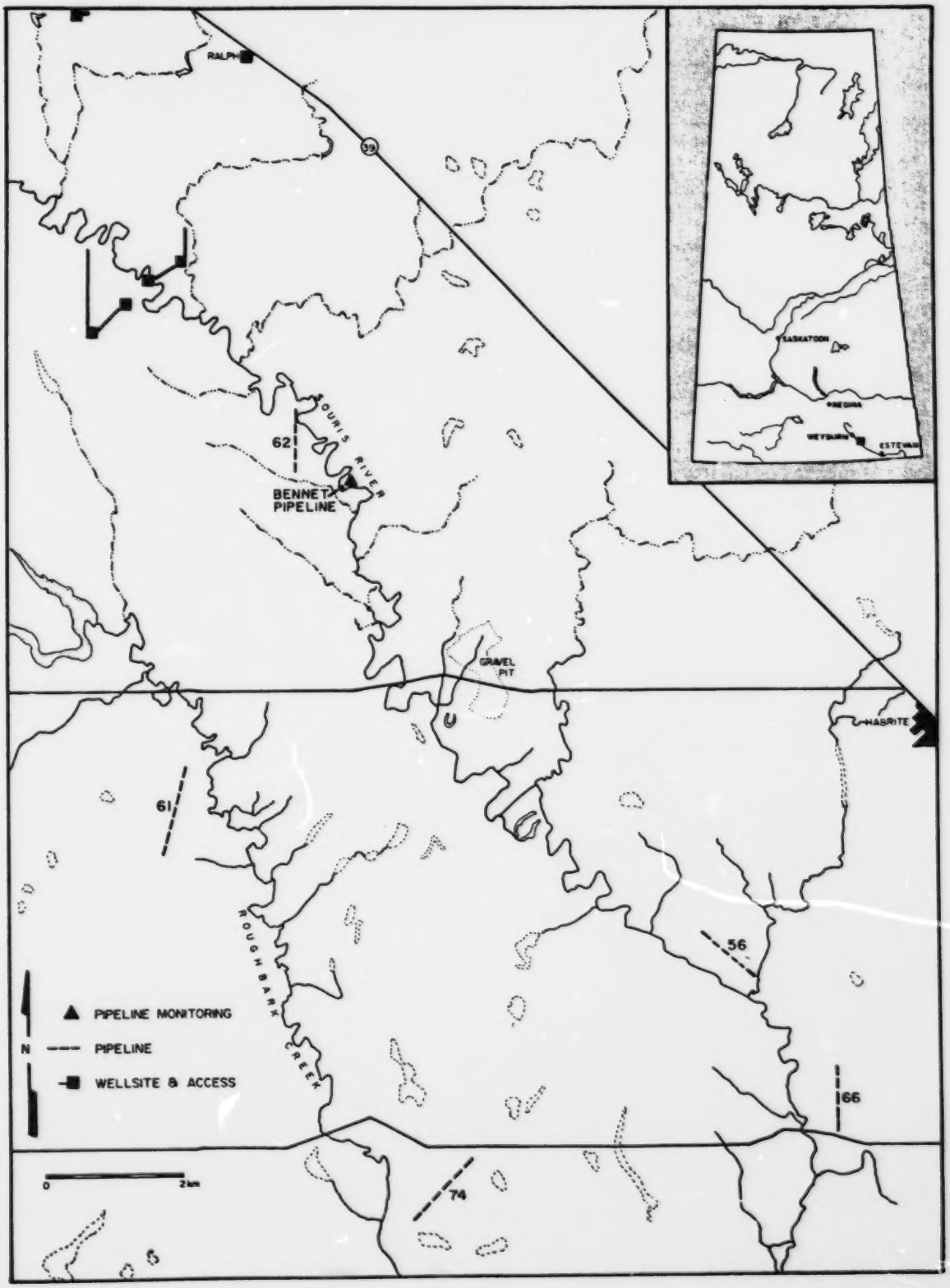

Figure 2.1 PanCanadian Petroleum Developments Examined by the SRC.

3 PREVIOUS RESEARCH IN THE STUDY AREA

Until recently the southeastern corner of the province had received only limited professional archaeological attention. The first professional survey was carried out in 1951 by Boyd Wettlaufer under contract to the National Museums of Canada (Wettlaufer 1951). However, two years earlier, the avocational archaeologist W.J. Orchard (1948) had conducted a survey in this corner of the province.

Some 50 km downstream of the study area, members of the Saskatchewan Museum of Natural History (SMNH) conducted a two day reconnaissance study of the then proposed Boundary Dam Reservoir during April, 1957. Based on the results of this initial reconnaissance, the SMNH conducted a more intensive inventory between May 27th and June 24th of that same year. Some 27 sites were recorded along a 16 km section of Long Creek. One of these sites was singled out for extensive excavation. The Long Creek site, excavated by both Mayer-Oakes and Wettlaufer (1960), was a stratified multicomponent site ranging in age from 3043±125 B.C. to an estimated terminal date of A.D. 1500-1600. The results of the excavations here helped to establish much of the cultural chronology for the last 5000 years of northwestern Plains prehistory.

In the years that followed, archaeological investigations in the southeastern corner of the province were completed at the Oxbow Dam site (Nero and McCorquodale 1958),

the Glen Ewen Burial Mound (see Kehoe and Kehoe 1968), the Moose Bay site (Hanna 1976), and the Moose Mountain Medicine Wheel (Kehoe and Kehoe 1979). Throughout this time period, there was also extensive collecting of Paleo-Indian sites around Kisbey (Ebell 1970, 1972; Hawman and Moat 1971; Hlady 1967; Moat 1974). In 1976 a late prehistoric human burial was discovered in a gravel pit located near Estevan (Walker 1984), and in 1979, Aresco Ltd. carried out an inventory class study along the north side of the Souris River near Bienfait.

The Saskatchewan Heritage Property Act came into effect in 1980. In the same year, the SRC conducted an HRIA study of the then proposed Weyburn Water Supply Project. A total of 19 sites and five findspots were recorded (Klimko 1981). None of these sites were recommended for additional mitigation.

In 1982/1983, the SRC conducted an HRIA study of two stone circle sites, located along Highway 9 on either side of the Souris River for Saskatchewan Highways and Transportation (Finnigan 1983). At the same time, the SRC investigated a natural gas pipeline route for the Saskatchewan Power Corporation (Wilson et al 1983). Since this time, the SRC has completed three additional projects in this corner of the province including a survey of the proposed Rafferty Reservoir (Finnigan 1985a), a monitoring of the construction of the City of Estevan water pipeline (Finnigan 1985b), and

a survey and mitigation study for a proposed revision of Highway 47 (Finnigan 1986), in addition to this present study. Over the same time, ARMS has completed a number of small scale HRIA surveys, as well as site documentation and mapping in the area (Thomas 1983; Germann 1984, 1985). Finally, Burley (1986) has completed a survey in areas for PanCanadian Petroleum Ltd.

The area is known to have been utilized prehistorically for over 10,000 years. As the prehistory of southern Saskatchewan has been succinctly summarized by Dyck (1983), and of the Souris Basin, in particular, by Fox (1982), this information will not be summarized here.

The area is less well known during the historic period. There were no fur trade posts in the region and there was apparently little or no exploration until the Palliser expedition of 1857. Perhaps due to the relatively late date of exploration in the area, little is known about the Indian groups who occupied it. In 1857 Palliser reported seeing an Assiniboin camp on the bank of the Souris River near Roche Percee (Spry 1968). It is known archaeologically that the area was occupied by people from the Middle Missouri region - probably Hidatsa (Byrne 1973; Mayer-Oakes and Wettlaufer 1960). Later it is assumed that the area was utilized by Metis bison hunters from the Red River District (see Ray 1974).

The Souris River Basin appears to have substantial ar-

chaeological potential. Previous studies have demonstrated that a wide range of site types can be expected: valley bottom campsites, burial sites (with and without mounds), various stone constructions such as tipi rings and cairns, and perhaps some Metis camps. Projectile point styles indicate that the region has been occupied for the last 10,000 years (Kehoe 1966). In addition, there is evidence that the area was exploited by both full-time Plains bison hunters and seasonal hunters/horticulturists from the Middle Missouri region (Finnigan 1985a).

4 INVESTIGATION OF FOUR WELL ACCESS ROADS IN 9-7-13

4.1 Introduction

In the winter of 1984-1985, ARMS permitted PanCanadian Petroleum Ltd. to develop four well sites. In the following spring (April 3rd, 1985), PCP asked the SRC to examine the four associated well site access roads prior to their construction. The SRC was also to examine an undeveloped road allowance which was to be developed at some future date. The access road right-of-ways (r-o-w) were expected to be staked by April 10. The author and Mr. William Ferris, both of SRC, began the survey of these developments on April 12. At this time it became apparent that two of the proposed roads had been partially scraped of topsoil. These areas were left and the remaining access roads were examined. We returned to the area on April 19th and completed the investigation of the two roads that had been previously affected. Finally, in early June, the author returned to the area and completed the investigation of the undeveloped road allowance. Approximately 8 person hours were expended in this project which was completed under HRIA Permit No. 85-9.

4.2 Development Overview

All four access roads were 20 m in width. The four wells serviced by these roads were located in 4-9-7-13, 6-9-7-13, 16-9-7-13, and 10-9-7-13. The total area affected by all four projects was 4.2 ha. In addition, the undevel-

oped portion of the road allowance between sections 8 and 9 was to be investigated.

4.3 Study Objectives

The objectives of this study were to identify any heritage resources that would be affected by these developments. Any sites in conflict with the development were to be assessed and appropriate measures to mitigate development impacts were to be formulated. In all cases, where feasible, r-o-w relocation was to be persued as the preferred mitigation response. In addition to the above, ARMS requested that SRC examine the four well sites to assess whether any resources had been affected.

4.4 Methodology

Two basic survey methodologies were applied in the investigation of these project areas. The first, pedestrian survey, involved walking over the area to be affected and noting any artifacts or cultural features. A single pass with the surveyors spaced 15 m apart was completed.

The second survey technique employed in previously disturbed areas was a windshield survey. The survey vehicle was placed in its lowest gear and depending on terrain, the motor was allowed to idle. The truck was moved along at about the rate of a slow jog while the terrain was examined on both sides. When artifacts or features were spotted,

they were investigated through pedestrian survey techniques.

All new resources were recorded on Saskatchewan Heritage Resource Record forms. All resources located within or immediately adjacent to the project impact zone were assessed. Assessment activities included examining the surface for artifacts and/or cultural features, and subsurface testing.

4.5 Results

4.5.1 Undeveloped Road Allowance

The undeveloped north/south road allowance runs north from the access road to 4-9-7-13. The road allowance traverses a rocky pasture over most of its route. Starting back from the valley edge, the development crosses over the valley summit and continues down into the valley proper (Figure 4.1).

During this investigation, three new heritage resources were recorded, each of which was situated within the road allowance. Each of the three sites are briefly described below.

DjMw-36: This was a stone circle site located 100 m north of the access road to PCP Well 4-9-7-13. The site consists of two stone circles situated 4 m apart. Each stone circle was 4 m in diameter. Stone circles of this size are thought to represent the anchoring stones that were used to hold

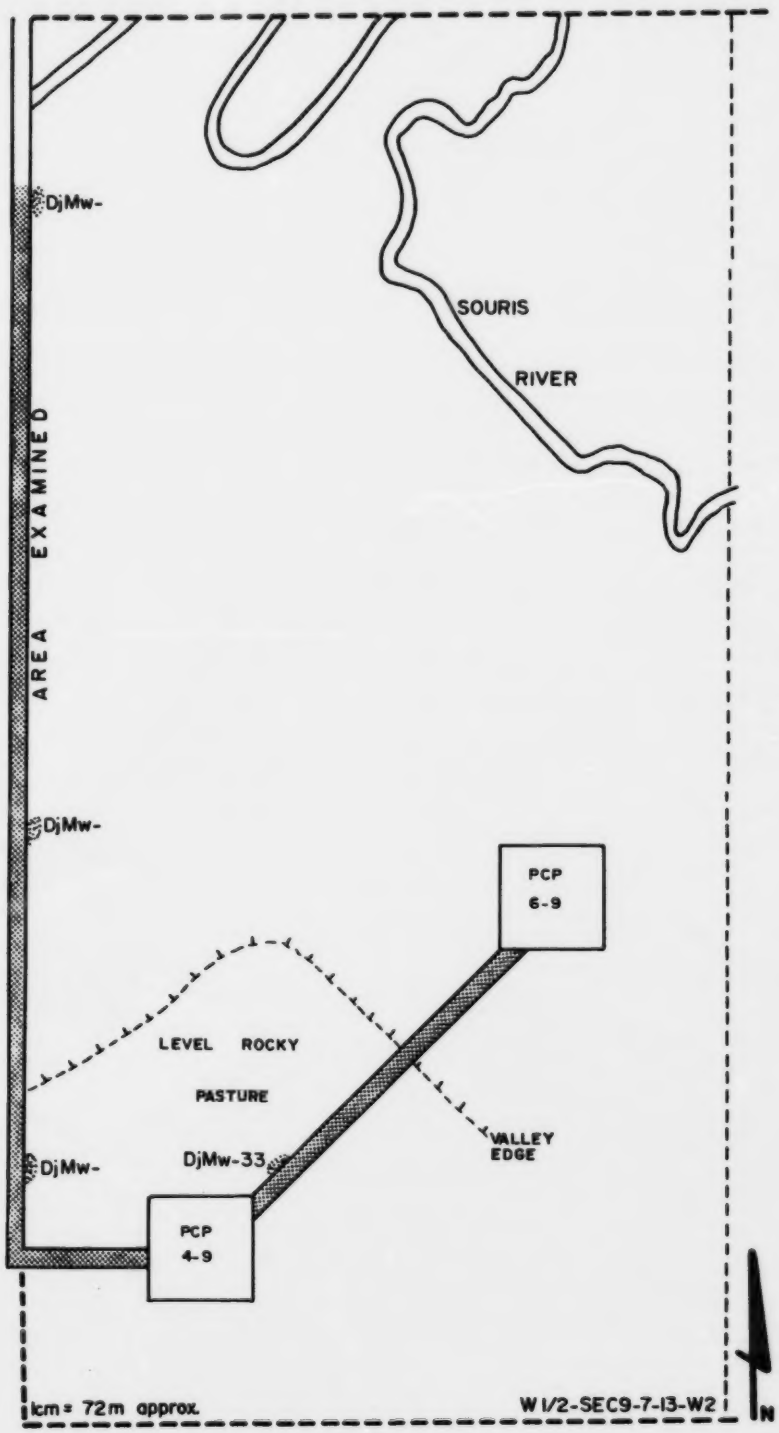

Figure 4.1 Access Roads Investigated in the West Half of 9-7-13.

down the edge of a hide tipi - the conical tent used by the Plains Indians (see Finnigan 1982; Quigg and Brumley 1984). No shovel testing was completed at this location.

DjMw-37: This was a stone circle site located 200 m north of the access road to PCP Well 4-9-7-13. The two stone circles were 17 m apart and measured 5 and 6 m in diameter. As with DjMw-36, stone circles of this size are thought to represent locations where tipis were once located. No shovel testing was conducted at this location.

DjMw-38: This was a stone circle site located 1200 m north of the access road to PCP Well 4-9-7-13. There were two stone circles at this site with inside diameters of 4 and 5 m. No shovel testing was completed at this location.

All three resources would be affected by this development. However, these resources were not assessed as no clearly defined time frame for development had been indicated. As a result of this misunderstanding, this road allowance was developed prior to the submission of recommendations for feature mapping and assessment.

4.5.2 Access Road to 4-9-7-13

This well access road travels straight east from the existing road which runs north along the road allowance between Section 8 and Section 9, to the west edge of PCP Well

4-9-7-13 (Figure 4.1). The total length of the road was 142 m and the total land area affected by the development was 0.3 ha. This project was located back from the valley edge in an area described by the surveyors as level rocky pasture.

The topsoil had been scraped off the r-o-w prior to our investigations. Apparently this damage occurred when snow was bladed off of the proposed access road during the previous winter. The scraped r-o-w was subjected to a pedestrian survey as was the area immediately adjacent to the r-o-w. No resources were recorded during this survey and no testing was carried out. It should be noted that the lighting conditions were quite poor for detecting stone features at the time of this investigation.

4.5.3 Access Road to 6-9-7-13

This access road runs from the northeast corner of PCP Well 4-9-7-13 to the southwest corner of PCP Well 6-9-7-13 (Figure 4.1). The access road was 401 m in length and the total area affected by the development was 0.8 ha. The southern half of the access road was situated on level rock pasture. Approximately halfway along the route the access road crosses the valley summit and descends into the Souris River Valley. This well site was located approximately 70 m southwest of the river.

The access road had been scraped by heavy equipment

prior to the time of our initial inspection, but the degree of disturbance at this development was not as severe as at the previous location. Both the scraped r-o-w and the area immediately outside of the r-o-w were surveyed on foot. A single cultural resource was recorded.

DjMw-33: This resource was recorded at a distance of 125 m north of the wellhead at 4-9-7-13. This site contained six definite and one possible stone circle. Only one stone circle and the possible stone circle were located within the access road r-o-w. A shovel test was completed in the center of the stone circle and two flakes of Knife River flint (KRF), one chert flake, and a piece of fire-cracked rock (fcr) were recovered. A test pit completed immediately outside of this feature was sterile. The presumed center of the possible stone circle was also tested but with negative results. Similarly, a test located in the center of a stone circle located immediately to the north of the r-o-w was sterile.

As the results of the first test were positive, and as the basic structure of the stone circle located within the r-o-w was still intact (only the tops of the rocks had been scraped and crushed), it was recommended to PanCanadian Petroleum Ltd. that the r-o-w be relocated 10 m to the southeast. A survey of the area located outside of r-o-w indicated that no additional features would be affected as a

result of this relocation.

4.5.4 Access Road to 16-9-7-13

This access road comes off an existing gravel road that runs midway (E-W) through 16-9-7-13 (Figure 4.2). The access road runs south, following along the west edge of a ravine, until it enters the northeast corner of 16-9-7-13. The entire r-o-w was situated on cultivated land.

Visibility was quite good at the time of this survey. For that reason, and because the entire r-o-w had been cultivated, a windshield survey was carried out. No cultural resources were identified and no testing was carried out at this location.

In August, ARMS revisited the project locale and recorded a new resource, a lithic scatter site, in the cultivated field adjacent to the access road (Germann 1985). It was the opinion of ARMS that a portion of this site was impacted by this development (ibid). No diagnostic artifacts were collected from this site (DjMw-35) and no shovel testing was carried out at this location.

4.5.5 Access Road to 10-9-7-13

This access road ran from the southwest corner of PCP Well 16-9-7-13 to the northeast corner of PCP Well 10-9-7-13, a distance of 362 m (Figure 4.2). The total area affected by the development was 0.8 ha. The access road was

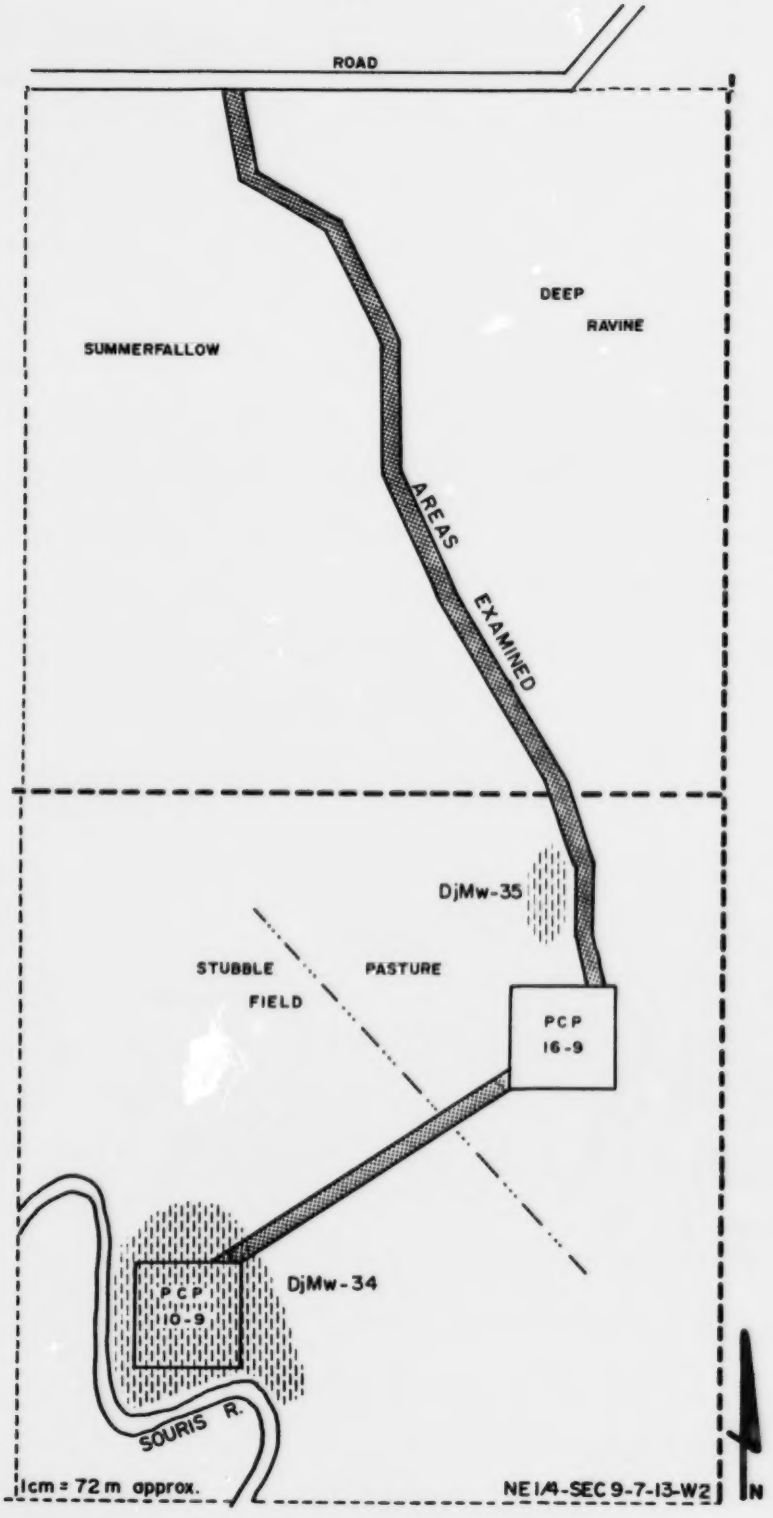

Figure 4.2 Access Roads Investigated in the East Half of 9-7-13.

situated on the Souris Valley floodplain and the well was located only a short distance away from the river. Only about the first 75 m of the route (from PCP Well 16-9-7-13) was in pasture, the remainder of the route had been cultivated.

Visibility was quite good in the cultivated portion of this project. This section was investigated via a windshield survey. The uncultivated section of the r-o-w was subjected to a pedestrian survey. No resources were encountered during this study and no testing was carried out.

In August, ARMS revisited the project location and discovered a new resource, DjMw-34, immediately adjacent to the PCP Well site in 10-9-7-13 (Germann 1985). This was a lithic reduction/faunal processing site. A Prairie Side-Notched projectile point was noted at this site, and points of this style are known to date to between 1150 to 700 B.P. (Dyck 1983:126-132). This resource appeared to have been impacted by the well site development and may have also been affected by the access road.

4.6 Summary

Four access road projects and one road allowance were examined during this study. Two of the roads had been affected by heavy equipment prior to our inspection and two of the roads were located on cultivated land. A single heritage resource (DjMw-33) was recorded on the access road to

PCP Well 6-9-7-13. An additional three resources were located on the road allowance (DjMw-36, 37, 38). Two resources were also recorded by ARMS during a post impact study of the well sites in 10-9-7-13 and 16-9-7-13 (DjMw-34, 35).

4.7 Recommendations

The following recommendations apply to these developments:

1) The access road in the vicinity of DjMw-33 should be relocated 10 m to the southeast. No additional investigation is required.

2) Both DjMw-34 and 35 may require additional investigation if any further development occurs in the immediate area of these resources.

5 INVESTIGATION OF FIVE PIPELINE REPLACEMENTS

5.1 Introduction

Seven of PanCanadian Petroleum's projected pipeline replacements for 1985 were located within 1 km of either the Roughbark or Souris valley edges, and thus, under a screening arrangement between PCP and ARMS, these were submitted to ARMS for review. ARMS determined that five of the seven were either adjacent to known archaeological resources or areas of medium to high archaeological resource potential, and therefore required additional investigation. On April 10th, PanCanadian Petroleum asked the SRC to examine the five pipeline replacements. They were examined on April 18th under HRIA permit No. 85-12.

5.2 Development Overview

The r-o-w's, for the replacement pipelines were 15 m wide, although the actual trenches would be less than 2 m in width. The replacement trenches would be approximately 1.6 m in depth. The preferred replacement strategy was to place the new trench parallel to, but 2 m outside of the centerline of the existing trench. As described by PanCanadian Petroleum Ltd. in a letter dated April 10th, 1985, the five water injection pipeline replacement projects were located as follows:

Project Location	Construction Date
Project #56 06-08-06-12 to 16-07-06-12	January, 1986
Project #61 05-16-06-13 to 06-21-06-13	January, 1986
Project #62 08-03-07-13 to 11-34-06-13	January, 1986
Project #66 12-04-06-12 to 04-04-06-12	August, 1985
Project #74 16-35-05-13 to 06-35-05-13	January, 1986

Only some sections of each pipeline were being replaced. Project 56 involved 760 m in the northwest quarter of section 8, 90 m in the southwest quarter of the same section and 351 m in the northeast quarter of section 7. Project 61 consisted of 807 m of r-o-w in the northwest quarter of section 16 and 628 m in the southwest quarter of section 21. Project 62 consisted of 613 m of r-o-w in the southeast quarter of section 3 and 448 m in the northwest quarter of section 34. Project 66 involved 793 m of r-o-w in the west half of section 4. Project 74 consisted of 259 m of r-o-w in the west half of section 35 and 807 m in the northeast quarter of the same section.

5.3 Study Objectives

The objectives of this study were to examine the r-o-w for each segment of pipeline that was being replaced in order to determine if any heritage resources would be affected by the replacement. If there was a conflict, the resource was to be assessed and then recommendations were to be made as to how the conflict with the development could be avoided. The prefered impact mitigation strategy was to stay within the existing pipeline r-o-w.

5.4 Methodology

Two basic survey methodologies were applied; pedestrian survey and a windshield survey. The former involved walking

over the area to be affected and noting any artifacts or cultural features. A single pass was made with the surveyor's spaced 10 m apart. The latter survey technique, used in previously disturbed areas, involved examining the terrain out of both sides of a slow moving truck. When artifacts or features were spotted, they were investigated through pedestrian survey techniques.

All new resources were recorded on Saskatchewan Heritage Resource Record forms. All resources located within the project impact zone were assessed. Assessment activities included examining the surface for artifacts and or cultural features, and subsurface testing. All tools and diagnostic artifacts located within the impact zone were collected.

5.5 Results

5.5.1 Project No. 56

This pipeline replacement project lay between 6-8-6-12 and 16-7-6-12 to the northwest (Figure 5.1). The total length of the project was approximately 760 m and the total area of disturbance was approximately 1 ha. The entire project r-o-w was located on the gently sloping north side of the Souris River Valley. The predominant surface cover was natural grasses. The ground cover was light and the surface visibilty was very good.

Two heritage resources had been previously recorded in the general project area: DiMv-5 and DiMv-52. The field

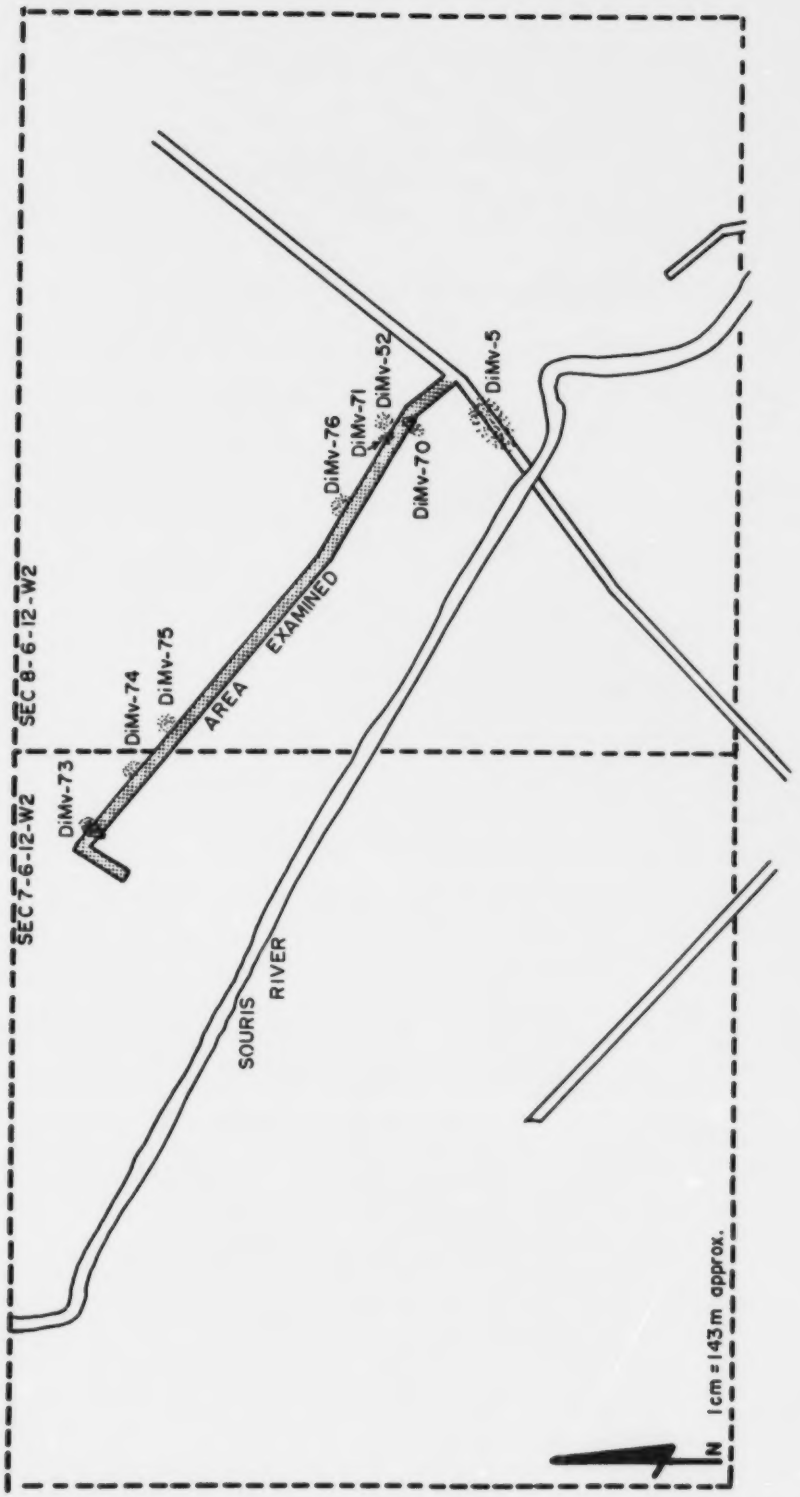

Figure 5.1 Areas Investigated For Pipeline Replacement Project No. 56.

inspection demonstrated that DiMv-5 was located to the south in another pipeline trench, while DiMv-52 was located at least 100 m east of the proposed development. Thus it was ascertained that neither of the previously recorded resources would be affected by the proposed pipeline replacement.

The entire r-o-w was subjected to a pedestrian examination. The r-o-w was not staked at the time of our investigation, so its location was determined by following the disturbance caused by the original trench. About one-half of the way along the project we ran into a bench of land on which appeared to be three old pipeline scars. Since two of the scars appeared to be in the same area as the proposed project, both were examined. The investigation of project #56 resulted in the recording of six new heritage resources. Each is briefly described below.

DiMv-70: This was a surface lithic scatter located in 6-8-6-12, approximately 65 m to the northwest of a pipeline valve. This resource consisted of a light scatter of lithic debitage over the surface of a small bench of land. A small slough bordered the northern edge of the site. A projectile point base was collected from the surface of this site (Figure 6.4). This base appears to be similar to the base of points assigned to the Early Side-Notched point complex. Projectile points belonging to this complex date to between

7700-4700 B.P. (Dyck 1983:92). This is the oldest point recovered in the valley to date.

This site appeared to lie largely to the west of the existing pipeline r-o-w which runs across the toe of a slope. While it is possible that the proposed pipeline replacement may further disturb a portion of this site, it is predicted that the overall impact will be minimal because the new trench will run to the west of the site. As this appeared to be a surface scatter, no testing was carried out at this resource. No additional investigation is recommended.

DiMv-71: This was a single stone circle which measured approximately 5 m across. The site is located 24 m northeast of the proposed pipeline replacement. The previously recorded site DiMv-52 is located a further 100 m to the east. Stone circles of this size are thought to represent the anchoring stones that were used to hold down the edge of the Plains Indian tipi.

This resource was located 27 m north of the proposed pipeline r-o-w and was not in any direct conflict with the development. No testing was carried out at this location.

DiMv-76: This was a stone circle site located in 11-8-6-12 on a bench of land presently crossed by three pipeline trenches. The single stone circle at this site was approxi-

mately 5 m in diameter. As this stone circle was located at least 40 m outside of the proposed pipeline replacement it will not be affected by this development. No testing was completed at this location.

DiMv-75: This stone circle site was located in 13-8-6-12. Three stone circles were noted but it was possible that several more features could be present. This site was located in an area crossed by several existing pipelines. All of the features are at least 40 m outside of the pipeline replacement r-o-w. No testing was completed at this location.

DiMv-74: This stone circle site was located in 16-7-6-12. The single stone circle here was approximately 4 m in diameter. This feature was located over 100 m from the proposed pipeline replacement and would not be affected by the development. However, this feature was located only 3 m outside of another pipeline trench and may be affected by future development. No testing was carried out at this location.

DiMv-73: This resource was located in 16-7-6-12. The site consists of six stone circles situated on both sides of the existing pipeline trench. Because several of these features could be in direct conflict with the proposed pipeline re-

placement, the existing pipeline trench and the location of all of the features were mapped using a transit and stadia rod (Figure 5.2). Subsurface tests, completed both inside and outside of one feature, were both sterile.

A copy of the transit map was forwarded to PanCanadian Petroleum Ltd. After discussing this conflict with ARMS, the recommendation was made that the development could proceed without the need for further investigation if it stayed completely within the existing r-o-w.

5.5.2 Project No. 61

Pipeline replacement project no. 61 is located between the PCP plant site in 12-16-6-13 and a PCP lease in 6-21-6-13 (Figure 5.3). The length of the project was 1435 m and the total area of disturbance was 2.2 ha. The pipeline r-o-w crossed the prairie towards the valley summit overlooking Roughbark Creek. The southern two-thirds of the project was cultivated. The cultivated section was subjected to a windshield survey and the remainder of the project area was investigated on foot. No previously recorded resources were located in the project area. The pipeline r-o-w was staked at the time of our investigation. A single cultural resource was recorded during the investigation of this project.

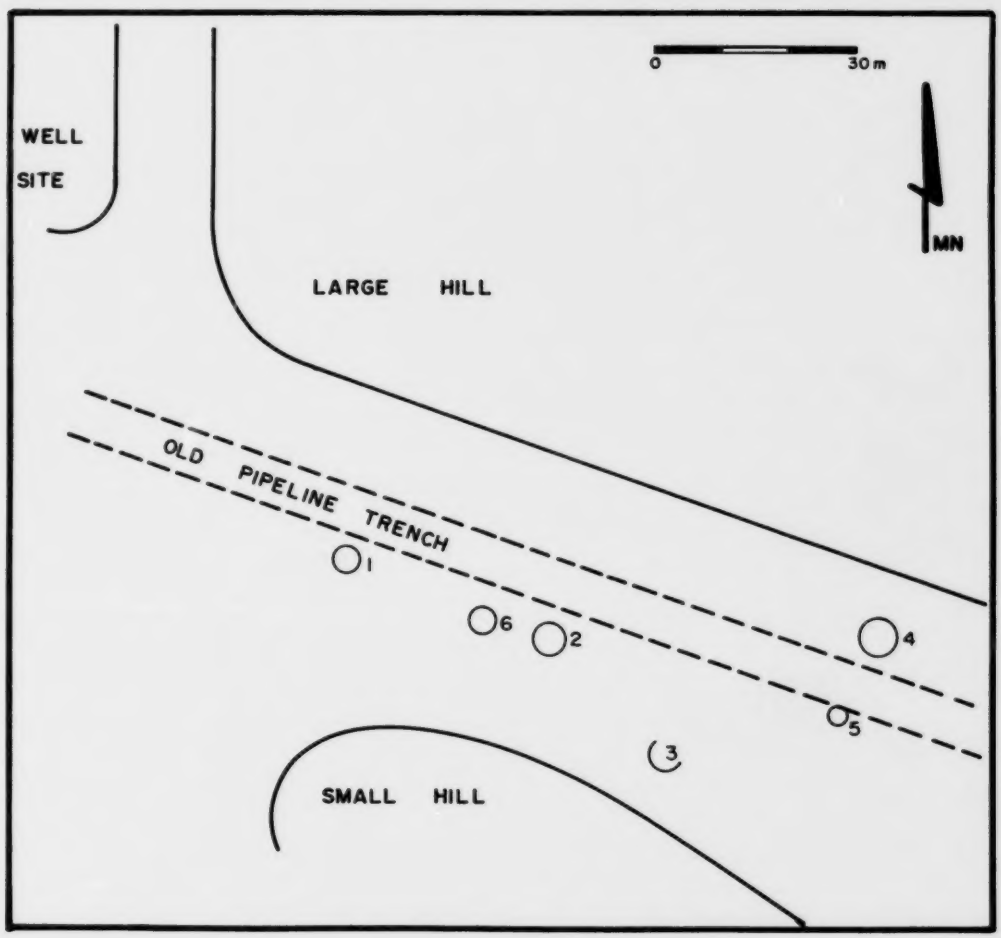

Figure 5.2 Site Map of DiMv-73 Showing the Existing Pipeline Trench.

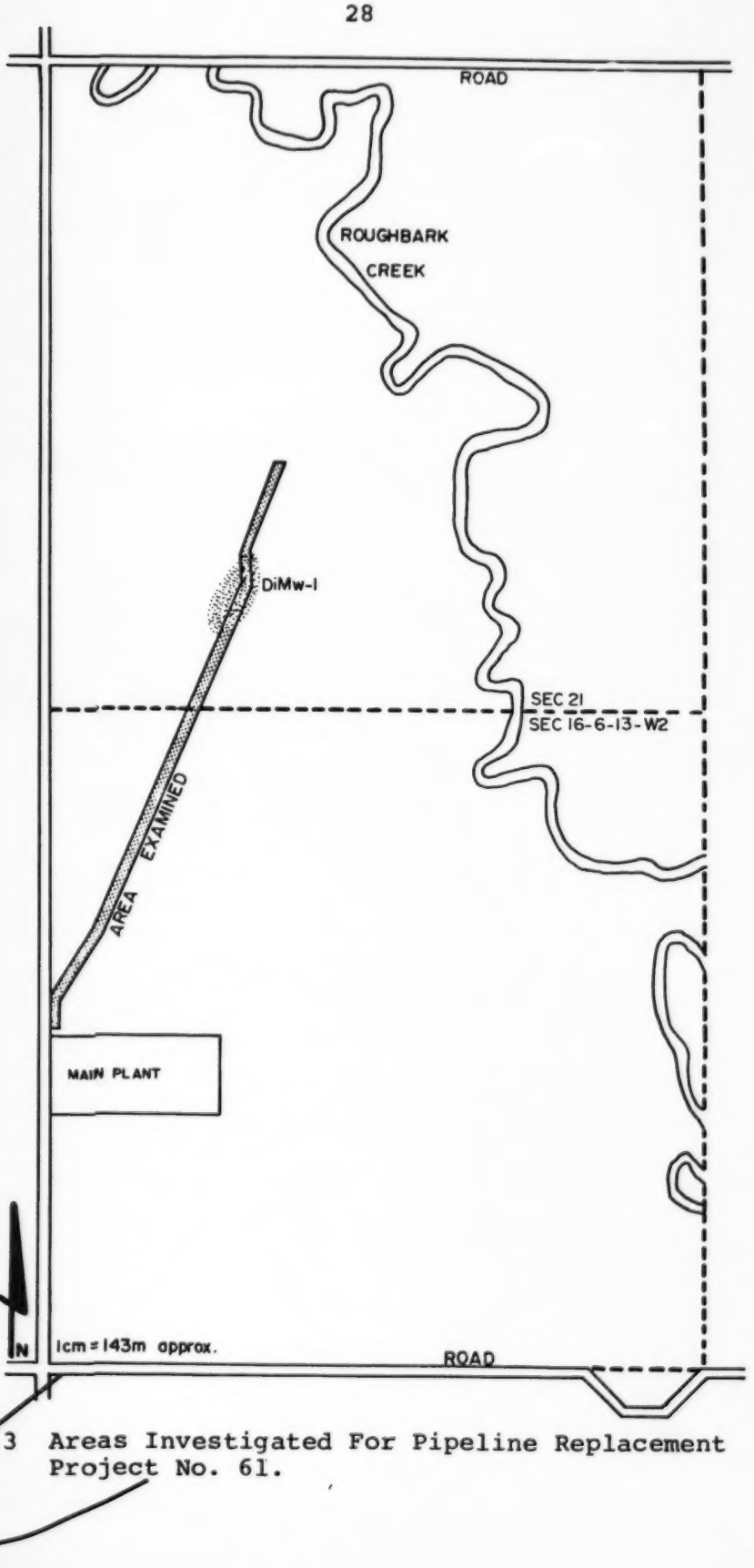

Figure 8.3 Areas Investigated For Pipeline Replacement Project No. 61.

DiMw-1: This site consisted of five stone circles, one cairn, and an historic foundation. Only one of these features, a stone circle, was in potential conflict with the proposed development. The edge of this stone circle abuts the west r-o-w edge. Two subsurface tests were completed at this feature, one inside and one outside, and both were sterile. This feature was staked and marked off with flagging to insure that it would not be affected by the pipeline replacement.

5.5.3 Project No. 62

Pipeline replacement project no. 62 lay between a well at 11-34-6-13 and a well at 8-3-7-13 (the project crossed a correction line). The total length of the development was 1061 m and the total area affected was approximately 1.6 ha (Figure 5.4). The project was situated along an uncultivated section of the Souris River Valley bottom. Two previously recorded resources were located in the vicinity of this project: DjMw-23 and DjMw-26 (the Horseshoe Bend site). Both resources were located considerably west of the proposed pipeline replacement. The centerline of the proposed r-o-w was staked at the time of our investigation.

The entire r-o-w was investigated on foot. No heritage resources were noted during this investigation. In addition, a cutbank adjacent to the lease at 8-3-7-13 was examined but no archaeological deposits were noted.

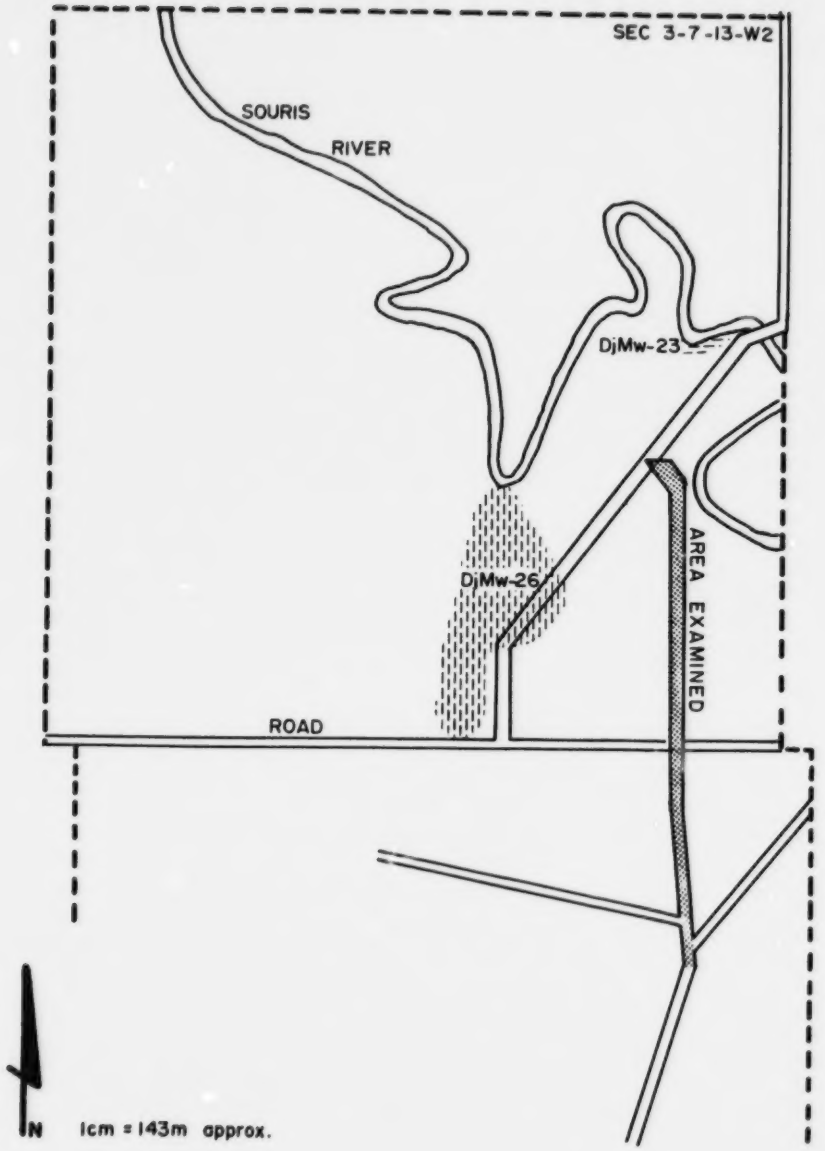

Figure 5.4 Areas Investigated For Pipeline Replacement Project No. 62.

5.5.4 Project No. 66

Pipeline replacement project no. 66 was located north-northeast from a battery site in 4-4-6-12 to a lease in 12-4-6-12 (Figure 5.5). The project was approximately 793 m in length and the total area of disturbance was approximately 1.2 ha. The project lay parallel to but several hundred metres east of the Souris River Valley. While the pipeline r-o-w was not cultivated, it runs along the west edge of a cultivated field in 5-4-6-12. The project was not staked at the time of the investigation and the visibility along the section in 5-4-6-12 was quite poor. There were no previously recorded heritage resources in this immediate area.

The entire r-o-w was subjected to a windshield survey. No heritage resources were recorded.

5.5.5 Project No. 74

Pipeline replacement project no. 74 extended northeast from a well in 6-35-5-13 to a well in 16-35-5-13 (Figure 5.6). The project was approximately 1066 m in length and the total area affected was 1.6 ha. The entire r-o-w was uncultivated and ran along level prairie towards the summit edge of the valley of Roughbark Creek. The r-o-w was not staked at the time of our investigation.

The entire r-o-w was examined on foot. A single heritage resource was recorded.

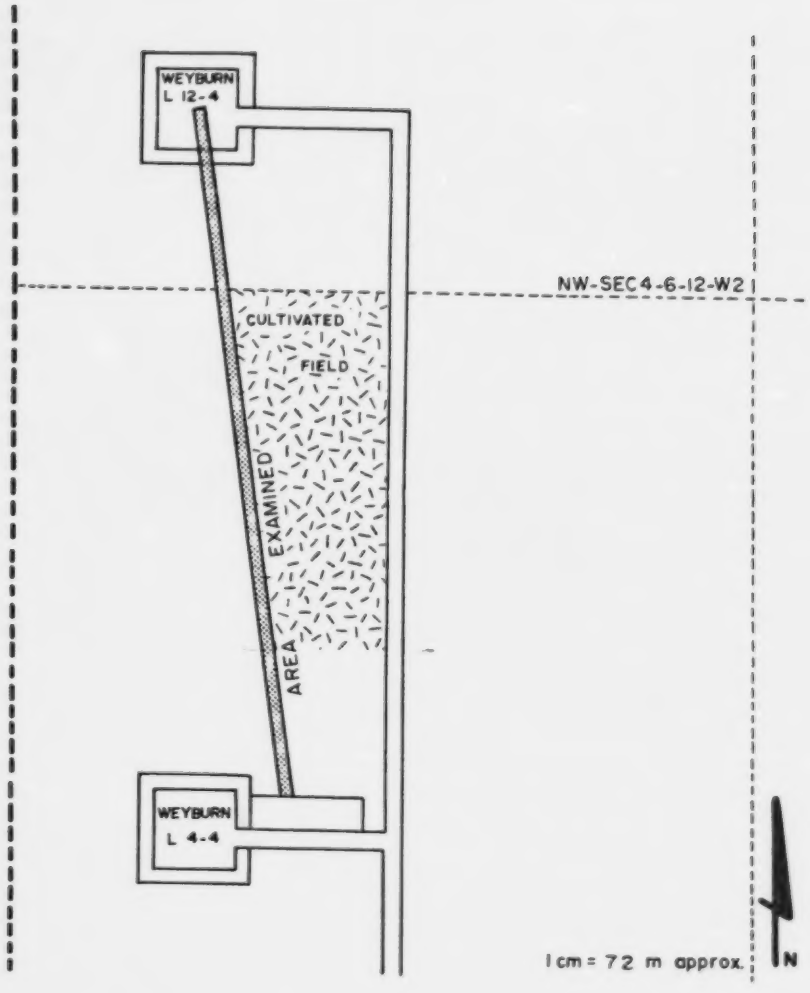

Figure 5.5 Areas Investigated For Pipeline Replacement Project No. 66.

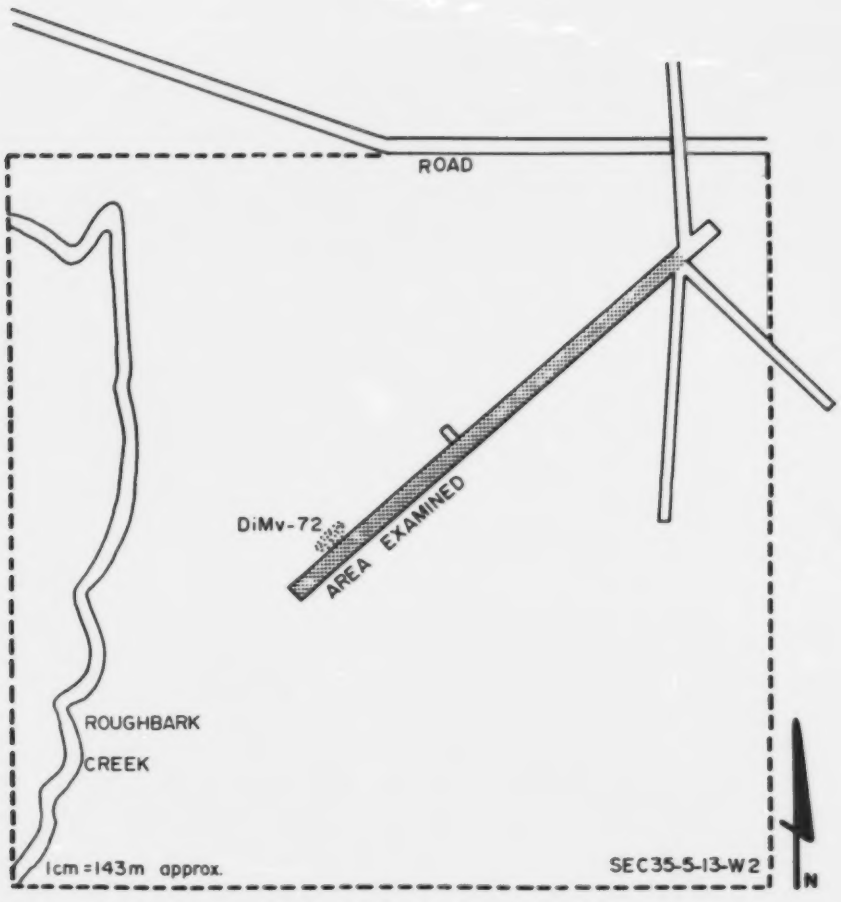

Figure 5.6 Areas Investigated For Pipeline Replacement Project No. 74.

DiMv-72: This resource, which consisted of two stone circles and a large stone cairn, was located in 6-35-5-13. None of the features at this site were in any conflict with the proposed pipeline replacement. The closest feature, a stone circle, was 25 m east of the existing pipeline trench. No testing was completed at this location.

5.6 Summary

Five pipeline replacements were investigated for this study and a total of eight new heritage resources were recorded. While several of the resources were located in close proximity to proposed pipeline replacements, none were in locations where they could not be avoided.

5.7 Recommendations

There are two recommendations resulting from this research.

1) Due to the large number of pipelines in this area, all pipeline trenches should be staked prior to investigation.

2) PCP should stay within the existing trench in the area encompassed by DiMv-73.

In all other areas, the identified resources will not be affected.

6 MONITORING A WATER-PIPELINE REPLACEMENT IN 16-34-6-13

6.1 Introduction

In December, 1984, PanCanadian Petroleum Ltd. asked the SRC to monitor the trench created during the replacement of a water pipeline in 16-34-6-13 (Figure 6.1). The major archaeological concern was that a section of the pipeline traversed the previously recorded Bennet Butchering site (DjMw-27) a stratified, multi-component site.

The project was delayed until early June. The author arrived at the site on June 10, and at that time was met by Stuart Lunn from PanCanadian Petroleum Ltd., and by Rod Sidloski - the Volunteer Regional Advisor for the Saskatchewan Archaeological Society (Weyburn region). Mr. Sidloski assisted the author throughout the course of this investigation. Additional assistance was also provided by Carlos Germann and Marvin Thomas of ARMS. A total of three field days were spent on this project which was completed under HRIA Permit 85-1.

After the trench had been backfilled, the project location was revisited by Mr. Sidloski, who located a number of additional artifacts including ceramics. This follow up work was quite important as no ceramics had been recovered during the monitoring process.

6.2 Development Overview

The water-pipeline replacement project ran from a well

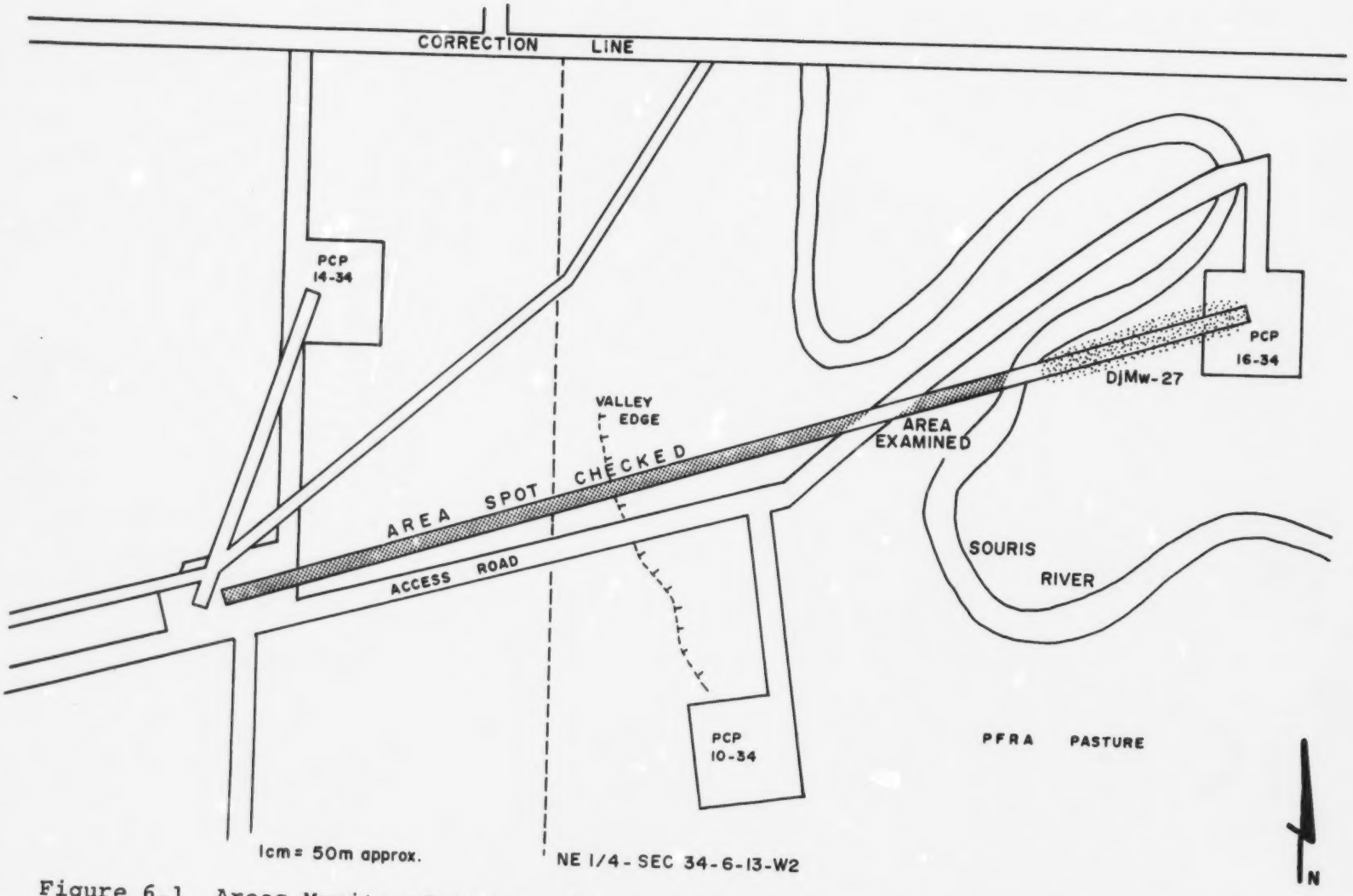

Figure 6.1 Areas Monitored During the Bennet Site Pipeline Replacement.

in 11-34-6-13 to a well in 16-34-6-13. Due to the perceived importance of this site, and to avoid the need for extensive mitigation, a modified pipeline replacement practice was recommended by ARMS. Approximately 300 m of trench, spanning both sides of the river, was to be reopened and reused. At the Bennnet site the replacement trench precisely followed the original pipeline trench from the injection well to the river (the backhoe operator followed the old pipeline; Figure 6.2). The new trench was approximately 1.6 m in depth and 1 m across. The new trench must have been slightly wider than the original trench as both trench walls appeared to have undisturbed profiles.

6.3 History of Research

The Bennet site was originally discovered by Rod Sidloski in 1979 who noted a hearth, bone, and several paleosols exposed in a cut along the Souris River. The site was reported to Pat Froese of ARMS and a resource record form was filled out in 1982. As first described, the site was thought to contain two or more cultural horizons, one of which contained ceramics. One possible hearth was noted in the cutbank along with bison bone and fire-cracked rock.

In the following year, at a distance of 35 m south of where the site was exposed in the cutbank, Mr. Sidloski noted a number of ceramic sherds and butchered bison bones on the surface of the disturbed area (10 by 12 m) created when

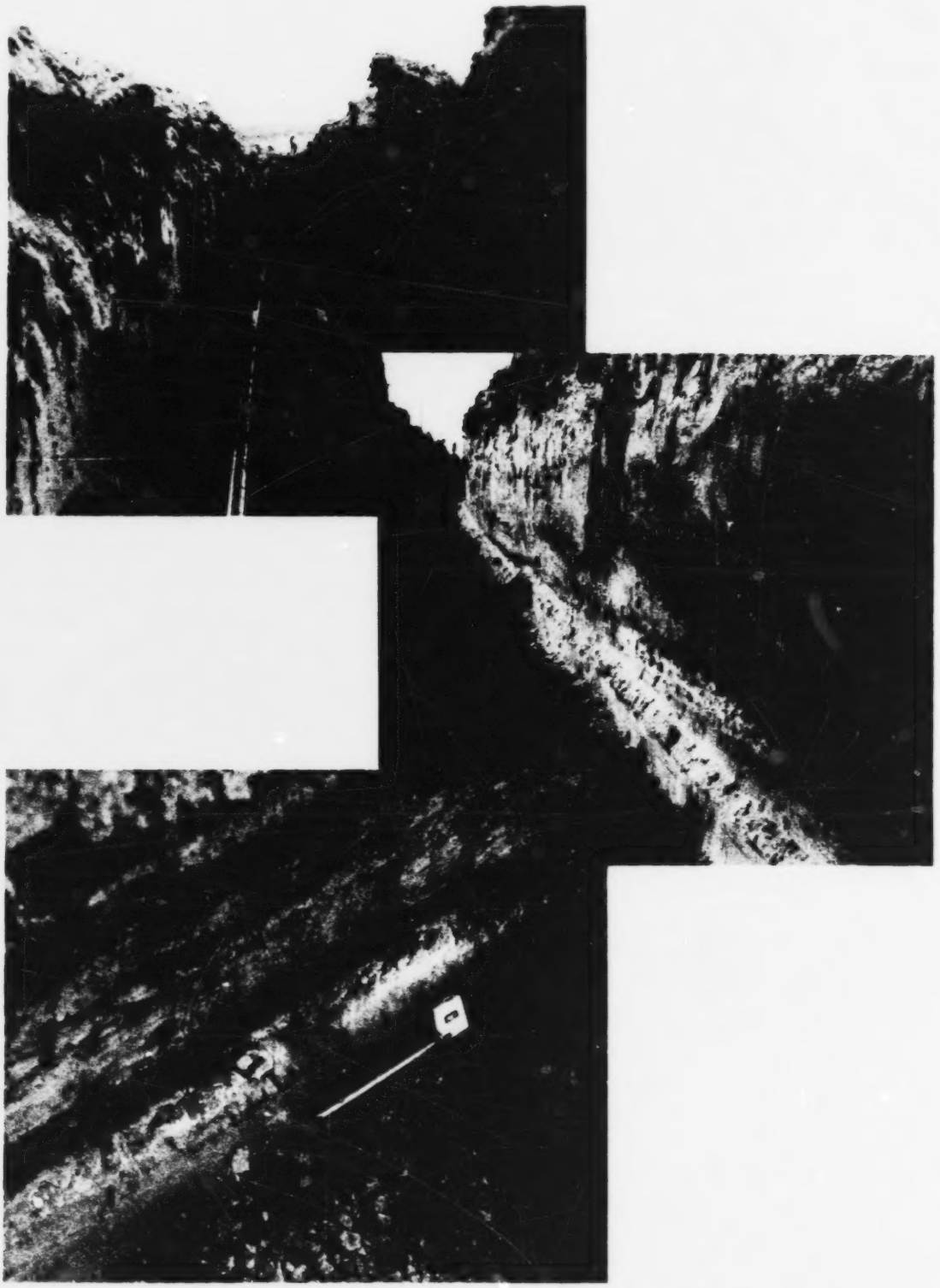

Figure 6.2 Top - Looking Down the Trench Towards the River; Middle - Looking North at Feature 9; Bottom - Looking South at Feature 11.

the pipeline was repaired. Mr. Sidloski applied for and was granted a Type B Heritage Resource Investigation Permit (84-4) to carry out further investigations at this site.

For this additional investigation, a 30 cm by 30 cm test pit was dug into the northern portion of this disturbed area and six cultural strata were recorded. A second test was completed in order to determine the location of the actual trench (this test also missed the trench by 45 cm). When the trench was located, a 3 m^2 area was completed. The reexcavated trench fill from this small excavation was screened through a 10 by 6 mm mesh screen. This excavation was located between 134.2 and 136.2 m southwest of the water injection well.

These tests resulted in the recovery of a large number of pottery sherds, bone and debitage. In addition, by the time of this study, three hearths had been noted and a triangular projectile point, an Avonlea projectile point, and some pottery had been collected from the site. On the basis of these results, it was recommended that any further trenching be carefully monitored (Sidloski 1985).

6.4 Research Objectives

The objectives of the trench monitoring study were:

1) to assess the degree of site disturbance resulting from the pipeline replacement;

2) to study the stratigraphy of the Bennet site along a

continuous exposure;

3) to document features and to systematically collect artifacts which would add to our knowledge of this resource.

6.5 Methods

As the trench was relatively shallow (1.6 m) the entire trench through the Bennet site was walked. Any buried features were briefly recorded and the following information was recorded: size, depth, distance from the injection well, association, and the presence of other paleosols either above or below. Thus, while the entire trench was not profiled, spot profiles were recorded along its length. In addition, any samples suitable for radiocarbon dating were selected, and bulk samples of the feature fill were obtained.

The spoil pile was also walked and examined for artifacts.

6.6 Results - Trench Monitoring

This section details the results obtained during the trench monitoring. Two projectile points (Besant) were collected while walking the spoil pile and these are described in Section 6.7.

6.6.1 Natural and Cultural Stratigraphy

Given the amount of time spent recording the features

at this site, and given that a portion of the site profile is available in the river cutbank, the trench was not profiled in detail, nor were any soil samples taken. However, it is possible to broadly describe the trench stratigraphy.

Paleosols could not be differentiated in the trench profile near the water injection well. However, approximately 100 m away, five paleosols were visible in the trench wall. Although this was the maximum number of paleosols noted in any of the sections examined during this investigation, Mr. Sidloski had noted a maximum of six paleosols. The paleosols were generally level but were not continuous throughout the length of the trench. A representative profile from Feature 20 is presented in Table 6.1. Those paleosols noted during the recording of features are illustrated in Figure 6.3.

Table 6.1 Soil Profile Collected At Feature 20.

0 to 18 cm dbs[1]	plow zone
18 to 33 cm dbs	light brown silty-loam
33 to 37 cm dbs	dark brown paleosol
37 to 65 cm dbs	light brown silty-loam
65 to 73 cm dbs	dark brown paleosol
73 to 106 cm dbs	light brown silty-loam
106 to 108 cm dbs	dark brown paleosol containing bone, charcoal, and a hearth
108 to 131 cm dbs	light brown silty-loam
131 to 135 cm dbs	dark brown paleosol
135 to 152 cm dbs	light brown silty-loam
152 to 153 cm dbs	dark brown paleosol
153 to 155 cm dbs	light brown silty-loam
Bottom of the trench	

[1]depth below surface

The cultural stratigraphy for the most part follows the natural stratigraphy. Most of the features and artifacts

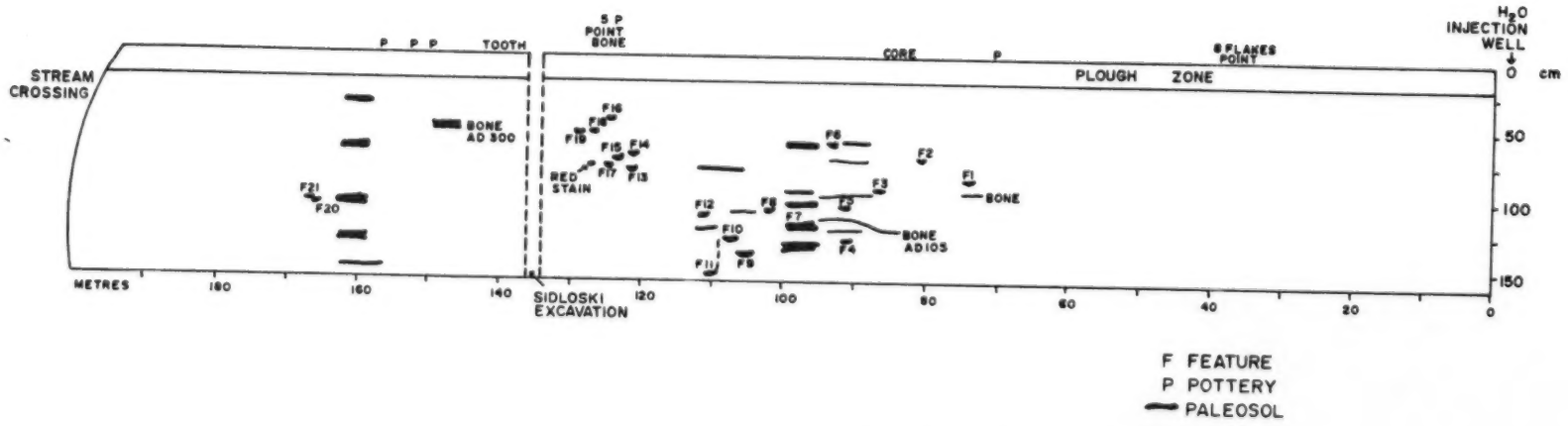

Figure 6.3 Backplot of Feature and Artifact Data Collected from the Bennet Site Trench.

observed are associated with the paleosols. The few exceptions to this, isolated finds of bone, were found closer to the injection well where no paleosols were noted.

6.6.2 Features

An inspection of the trench resulted in the recording of a large number of hearth features. Each of these features is briefly described below in order of increasing distance from the well head. The two feature measurements given here were taken from the profile. The horizontal measurement is arbitrarily described as the length.

73.7 m: Feature 1

A small ash stain was noted in the south wall of the trench at 87 cm dbs. There was very little left of the stain and it was not possible to determine its dimensions. In addition, at a depth of 97 cm, a few unidentifiable bone fragments were noted.

80.4 m: Feature 2

A charcoal lens was noted in the south wall at a depth of 73 cm dbs. The charcoal stain was 89 cm long and 1 cm thick. No bone was noted in the profile.

87.5 m: Feature 3

A hearth was noted in the north wall of the pipeline

trench at 95 cm dbs. The hearth measured 38 cm across and was 2 cm wide. The fill consisted entirely of ash. A sample of the fill was collected for further analysis.

At a depth of 1 3 m a second paleosol was noted. At the lower contact of this paleosol a thin horizon containing bone and fcr was noted. A radiocarbon sample from this occupation was dated to 1845±135 years B.P. (S-2726). According to information presented by Damon et al (1974), the corrected date is 103 A.D.

91 m: Feature 4

Feature 4 was a hearth located in the north wall of the pipeline trench at 1.3 m dbs. The hearth was 55 cm long and 3 cm thick. A sample of the hearth fill was retained for further analysis. The horizon containing this hearth was situated below the horizon containing the feature 3 hearth. The horizon containing feature 3 was situated here at a depth of 1.13 m. Another cultural horizon was noted at a depth of 0.75 m.

91 m: Feature 5

Feature 5 was located in the opposite trench wall from feature 4. The feature 5 hearth was situated at a depth of 1.07 m dbs. The hearth was 50 cm long and 4 cm thick and the fill consisted of charcoal and fcr.

A cultural horizon was noted above this hearth at a

depth of 64 cm dbs and an occupation level was noted beneath the hearth at 1.24 m dbs.

93 m: Feature 6

A small hearth was noted in the south wall of the pipeline trench at 64 cm dbs. The hearth measured 20 cm long and 2 cm wide and had ash for fill. Two cultural horizons were noted below the hearth, one at 1 m dbs and the second at a depth of 1.18 m dbs.

97 m: Feature 7

Feature 7 was a hearth located in both the north and south walls of the pipeline trench at 1.19 m dbs. The hearth measured 1.38 m in length along the north wall and was 4 cm thick. Along the south wall, the hearth was 1.17 m long and was 6 cm thick. The hearth fill consists of ash, charcoal and fcr. A sample of the hearth fill was collected for future analysis. This feature is illustrated in Figure 6.2.

102 m: Feature 8

Feature 8 consisted of a fire-reddened earth stain located at a depth of 1.10 m dbs. The stain measured 29 cm in length and was 6 cm thick.

105 m: Feature 9

Feature 9 consisted of a large hearth located in both the north and south walls of the pipeline trench at 1.42 m dbs. Along the north wall, the hearth was 1.69 m long and was 9 cm thick. Along the south wall of the trench, the hearth measured 2 m in length and was 13 cm thick. The hearth fill consists of ash and charcoal. A sample of the hearth fill was removed for later analysis. This feature is illustrated in Figure 6.2.

An additional cultural horizon was noted above this feature at 1.12 m dbs.

108 m: Feature 10

Feature 10 was a small hearth stain which was located at 1.3 m dbs. The hearth was almost completely destroyed so it was not possible to take measurements. The two projectile points recovered during this phase of the study were removed from the spoil pile in close proximity to this feature.

110 m: Feature 11

A hearth was noted in the south wall of the pipeline trench at a depth of 1.56 m dbs (Figure 6.2). This appeared to be the same cultural horizon as that containing Feature 10. The hearth measured 99 cm in length and was 10 cm thick. The hearth fill consisted of ash. A sample of the

hearth fill was collected for future analysis.

Two other cultural horizons were noted at this location. One was located at 81 cm dbs and the second was noted at a depth of 1.2 m dbs.

111 m: Feature 12

Feature 12 was a possible hearth stain which was located at 1.13 m dbs. Because the hearth was largely destroyed, it was not possible to take measurements or collect samples of its fill.

122 m: Feature 13

A hearth was observed in the south wall of the pipeline trench at 80 cm dbs. The hearth measured 96 cm long and was 4 cm thick. The hearth fill consisted entirely of ash.

122 m: Feature 14

Feature 14 was a hearth located in the north wall of the pipeline trench at a depth of 70 cm dbs. The hearth measured 1 m in length and was 5 cm thick. The hearth fill consisted of ash.

123 m: Feature 15

A hearth was noted in the south wall of the pipeline trench at a depth of 74 cm dbs. The hearth was 20 cm long and 2 cm thick, and the fill was composed of ash with some

charcoal. A cultural horizon was noted above this feature at 50 cm dbs.

124 m: Feature 16

The feature 16 hearth was located in the south wall of the pipeline trench at 45 cm dbs. The hearth measured 55 cm in length and 10 cm thick. The hearth fill consisted of ash. A sample of the ash was collected for future analysis.

124 m: Feature 17

Feature 17 was located below feature 16 at a depth of 77 cm dbs. This hearth measured 20 cm by 3 cm. The hearth fill consisted of ash.

127 m: Feature 18

A hearth was noted in the south wall of the pipeline trench at a depth of 54 cm dbs. An area of fire-reddened earth was noted below this at 79 cm dbs. Both stains were quite faint and no measurements were recorded. A small sample of the fill from the hearth was collected for future analysis.

129 m: Feature 19

Feature 19 was a faint hearth stain which was located in the south wall of the pipeline trench at 55 cm dbs. This hearth was nearly completely destroyed so no measurements

were taken.

166 m: Feature 20

Feature 20 was a hearth which was located in the south wall of the pipeline trench at 1.09 m dbs. The hearth was 44 cm long and 5 cm thick. The hearth fill consisted of ash, beneath which was a slight stain of fire-reddened earth. A sample of the hearth fill was removed for future analysis.

167 m: Feature 21

The feature 21 hearth was located in the south wall of the pipeline trench at a depth of 1.06 m dbs. This hearth was 74 cm long, 10 cm thick, and the fill consisted of ash.

In addition to the hearths, bone was found in the trench wall at a number of different locations. At a distance of 145 m from the injection well, bone was noted protruding from a cultural horizon between 50 and 57 cm dbs. A sample of bone from this horizon was radiocarbon dated to 1680±140 years B.P. Using information presented by Damon et al (1974), the corrected date would be 282 A.D.

6.7 Results - Post Impact Monitoring

Mr. Sidloski revisited the Bennet site after the replacement trench had been backfilled. An examination of the trench scar resulted in the location of a number of small

concentrations of artifacts including pottery and projectile points (Table 6.2). These finds are important because they have increased the artifact sample from this study and because they presumably came from a different section of the spoil pile. Mr. Sidloski assumed these artifacts were from the bottom of the spoil pile. If this assumption is correct, the same age range of artifacts was recovered from both the top and bottom of the spoil pile.

Table 6.2 Results of the Post-Impact Monitoring Investigation.

Distance from Injection Well	Material Collected
38.0 m W., 5.1 m N.	Besant point, (8 flakes left in place)
70.2 m W., 2.5 m N.	1 pottery rimsherd
85.7 m W., 2.1 m N.	Pebble core of Knife River flint
114.5 m W., 2.1 m N.	1 pottery sherd
118.0 m W., 5.7 m N.	1 pottery sherd
128.0 m W., 5.8 m N.	1 preform, 1 modified bone fragment, 3 pottery sherds
128.4 m W., 0.9 m S.	1 pottery sherd
128.5 m W., 0.7 m N.	1 pottery sherd
143.3 m W., 0.7 m S.	canine tooth
150.3 m W., 5.2 m N.	1 pottery sherd
152.6 m W., 5.6 m N.	1 pottery sherd
157.1 m W., 5.3 m N.	1 pottery sherd

In light of the two radiocarbon dates, this observation is not surprising. Both dates bracket the time period of Besant (Sonota) on the northern plains. In addition, an Avonlea point had been recovered earlier from the plow zone. The implication of the radiocarbon dates is that most of the trench deposits date to the time period of Besant (Sonota) and Avonlea on the northern plains.

6.8 Artifact Analysis

A total of three projectile points, a preform, and 11 pottery sherds were recovered during this investigation (Figure 6.4). Two of the projectile points are quite large and closely resemble the Sonota (Besant) points as described by Neuman (1975). The principal difference is that these two points have markedly concave bases while the Sonota points more characteristically have straight or convex bases (ibid). However, Sonota/Besant points with concave bases have been reported from the Whiskey Hill site in eastern Montana which is dated at 1550 B.P. (Johnson 1977). Here, Johnson (1977) describes five Sonota-type points, four of which have concave bases. One of the Bennet site points is manufactured from Knife River flint (KRF) and the second is manufactured from a red jasper.

The third point from the Bennet site is considerably shorter and more closely resembles the Besant points found elsewhere in Saskatchewan (see Dyck 1983). This point may have been reworked from a larger Sonota form however. This point is made of KRF.

The preform is not large enough to be a Sonota type point but it also has been reworked. This preform is made of KRF. The projectile point measurements are presented in Table 6.3.

Figure 6.4 Diagnostic Artifacts from All Projects: a,b-Sonota point; c - Besant point; d - point preform; e,f,g - pottery; h - Early Side-notch point; i - bone tool. (a-g and i are from DjMw-27, h is from DiMv-70).

Table 6.3 Projectile Point Measurements.

No.	Length	Width	Thick	Neck Width	Notch Width	Notch Depth	Basal Width
1	49	23	5	16	9	3	--
2	--	25	5	18	7	3	21
3	22	19	5	16	6	2	19
4	24	20	3	--	-	-	17

The pottery recovered from the site may be from a single vessel although, given its linear spread along the spoil pile, it is likely that more than one vessel is represented. All of the sherds exhibit a horizontal parallel grooved surface decoration. The sherds all have a grey paste. The single rim sherd has a rounded, outwardly sloping lip with an interior cord-wrapped-tool impression. This vessel(s) resembles Sonota pottery vessels (Neuman 1975). One major difference is that none of the sherds bear punctates.

The function of the single worked bone fragment is unknown. Some suggestions are that it may have been an uncompleted bone bead blank or that it may be a portion of a bone tool, perhaps used in pottery making.

6.9 Interpretations

There are limits to the interpretations that can be drawn from a narrow linear exposure such as this trench. However, some general conclusions can be drawn on the age of the site deposits and on the range of activities carried out.

As discussed, both of the radiocarbon dates obtained

from the trench fall within the time period of Avonlea and Besant (Dyck 1983), and Sonota (Neuman 1975:88). Elsewhere in the province, Sonota type points are found in sites which date near the beginning of the Besant time span, such as at the Melhagen site (Phenix 1969). The Bennet site, given its multiple Besant occupations, will be an important site for the study of Besant/Sonota interrelationships.

The presence of so many hearths (21) and no concentrated bone beds suggests that this site most likely represents a campsite/faunal processing locale rather than a killsite/processing situation. While, bison were being processed at this location, judging by the presence of bone in the wall and on the spoil pile, there appeared to be no evidence for the intensive processing one would expect in close proximity to a kill site.

The large number of hearths encountered in this study is puzzling. While it is possible that the large number observed is due to chance (i.e. the trench just happened to intersect the area of the site where most of the hearths are situated), the presence of at least three hearths in the cutbank, some 35 m away, suggests that this is not the case. Also of interest is the observation that, while many of these hearths are quite large, few appeared to contain any artifacts.

Hearths are created in a number of situations including heating, food processing, and firing pottery. Each activity

should result in some different evidence either in the size or the composition of the fill. For example, one of the hearths is nearly 2 m in diameter. This is not the size of hearth one would expect to be created for heating a domestic structure. Such a hearth could be used for specialized food processing such as bone boiling but there should be other evidence of this activity (i.e. small splinters of bone, piles of fire-cracked rock). It is suggested that instead, some of the larger hearths were being used to fire pottery. If several vessels were being fired it would be necessary to create a very large hearth. In order to test this hypothesis it would be necessary to detect heat spalls from ceramic vessels in the herth fill and it would also be necessary to identify a nearby clay source. Resolution of this hypothesis awaits the completion of additional work in the region.

A backplot of the hearths by depth is presented in Figure 6.3. This figure demonstrates that the stratigraphy of this site is relatively complex. It has been suggested that at least five occupations are present. The depth distribution of hearths suggests, on first inspection, that two times as many occupations could be present. There are however, several clusters by depth. Features 16, 18, 19, features 2, 13, 14, 15, 17, features 5, 7, 8, 12, 20, 21, and features 4, 9, and 10 all fall within a narrow range of depths. If these hearth clusters are expanded to include some of the other hearths, the number of potential occupa-

tions could easily be reduced to five or six. The most reasonable conclusion, based on present data, is that a maximum of five occupations were exposed during the trenching at this site.

The date of 1845 B.P., assigned to a level 130 cm dbs, suggests a sedimentation rate for the immediate site area of approximately 7 mm a decade. The date of 1680 B.P., located at 50 cm dbs suggests a sedimentation rate of only 3 mm a decade. If these dates are correct, then a very high sedimentation rate, approximately 46 mm a decade, would have occurred between 1680 and 1845 B.P. These data suggest that the sedimentation rates have varied considerably through time.

Assuming that the long term average sedimentation rate is around 7 mm a decade, the bottom of the pipeline trench should date to approximately 2300 B.P. This suggests that only the deposits at the very bottom of the trench predate Besant. It is very unlikely that the bottom of the trench represents the bottom of the site.

6.10 Recommendations

Any future work at this location that requires modifications outside of the existing pipeline trench should be preceeded by some additional mitigation.

7 EXAMINING A WELL SITE AND ACCESS ROAD IN 16-20-7-13

7.1 Introduction

In late September 1985, Pan-Canadian Petroleum Ltd. contracted the SRC and requested that they examine a well site in 16-20-7-13 as a rock pile had been reported in this lease on lands believed to have been uncultivated. The author visited the site location on September 24th of that year.

7.2 Development Overview

This project consists of a well site (120 m x 120 m) and a short access road (120 m). The access road comes in off a high grade gravel road located to the east. The development was staked at the time it was investigated.

7.3 Study Objectives

The objectives of this investigation were to ascertain whether the rock pile had any archaeological significance and, if it did, to assess the feature and to determine if it could be avoided by relocating the development.

7.4 Methodology

This area was investigated via pedestrian survey techniques. The area to be affected was walked over and any artifacts or cultural features were to be noted. Any new resources were to be recorded on Saskatchewan Heritage Re-

source Record forms. All resources located within or immediately adjacent to the project impact zone would be assessed.

7.5 Results

The investigation of this lease demonstrated that the rock pile in question was historic in age and related to field clearing. The lease itself had been reseeded to pasture. An investigation of the lease (visibility ranged from poor to fair) did not result in the recording of any new heritage resources.

7.6 Recommendations

No additional investigation is required at this location.

8 SUMMARY

Taken together, these four projects have made a contribution to our knowledge of Souris Basin prehistory. A total of 12 new heritage resources were recorded. One of the resources, DiMv-70, is an Early Side-notch component and this represents the earliest site recorded in the valley to date.

The trench monitoring at the Bennet site has added greatly to our knowledge of that resource. A total of 21 hearth features were recorded and two radiocarbon dates were obtained. The Bennet site (DjMw-27) is now known to contain multiple occupations which date to the Besant/Avonlea time frame. In particular, it is suggested that this site may be quite important for understanding the interrelationships between Besant and Sonota.

Finally, the radiocarbon dates obtained during the Bennet site monitoring have provided some important data on sedimentation rates on the valley floodplain. It is now known that even sites dating to within the last 2000 years can be expected to be quite deeply buried.

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